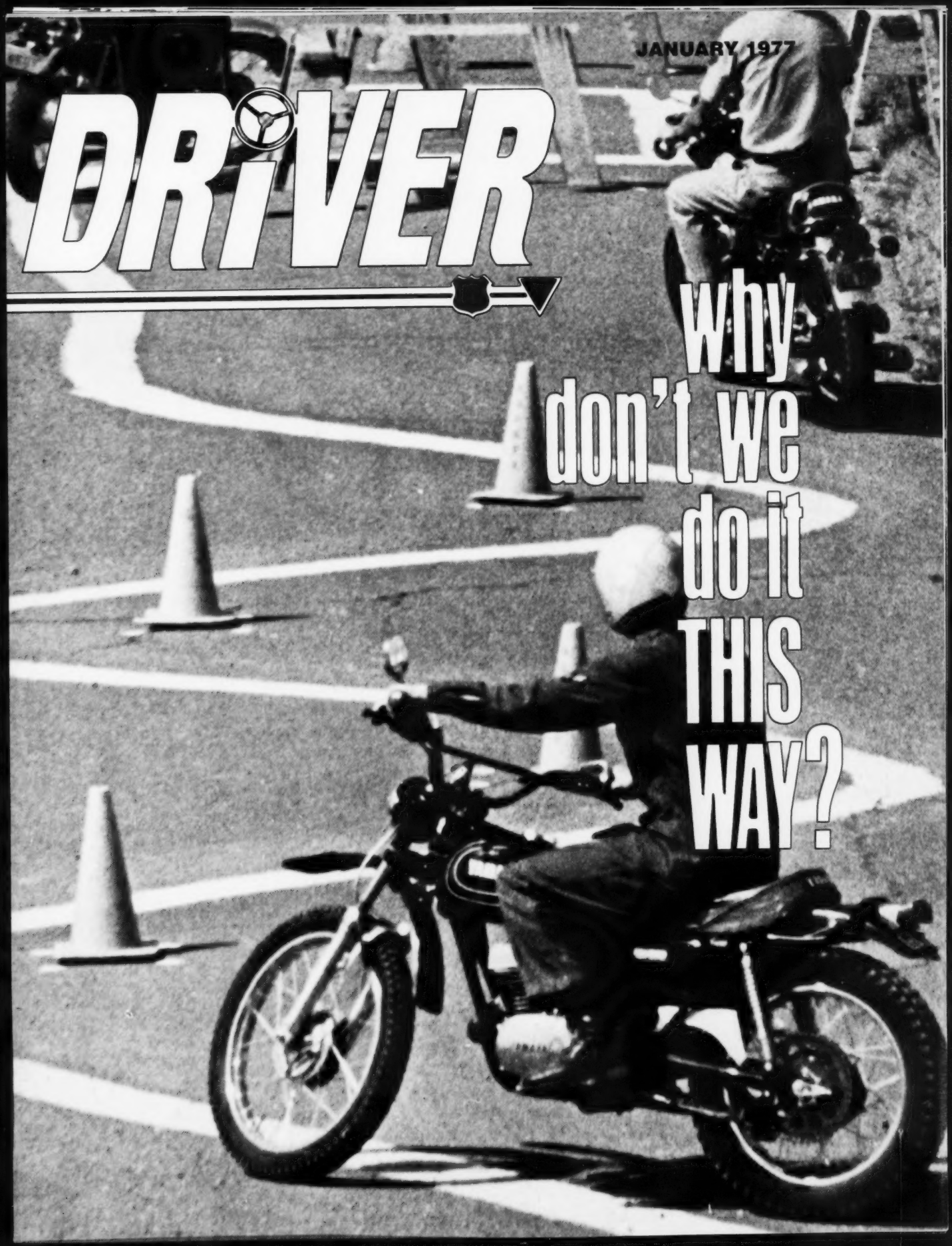
JANUARY 1977

DRIVER

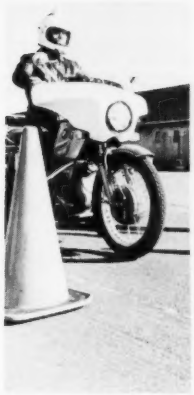


why don't we do it THIS WAY?

DRIVER

A look at a "better idea" in motorcycle instruction

WHY DON'T WE DO IT THIS WAY?



Most of us will admit that riding a motorcycle takes a different set of skills than driving a car. We should also admit that a motorcyclist's frame of mind, or attitude, is different too.

With these points in mind, DRIVER took a look at current Air Force motorcycle training and found that, while MM12 (the AF multimedia motorcycle course) is good, there is a lot of information that just can't be covered in the four hours of the course.

MM12 is primarily designed to acquaint a rider with the proper attitudes and emotions involved in motorcycling, and while riding techniques and tips are offered, again the time limit of four hours precludes giving a lot of info that is valuable not only to the newer rider but also to his more experienced friends.

Why not, we thought, get up a list of things that vehicle training instructors could add to the multimedia presentation and that would materially better a rider's ability to survive? It was a swell idea, but then we ran into a small hangup . . . any training other than MM12 *cannot* be mandatory. In other words, some bases do not have the manpower to conduct extra training over and above MM12, so DOD has said that such training is optional and *may* be conducted if the base has the manpower in the form of a qualified motorcycle instructor who can spare the time.

MMC Dennis Hamlin of the Norfolk NAS Motorcycle School conducts an inspection of a "students" Kawasaki. No high pressure tactics are used, no harassment or singling out . . . just courtesy and common sense. The trick is to inspire the rider to fix the bike, not scare him into it.

So here we were, with this great idea running around in our heads, and basically no way to implement it.

It was about this time that we got a letter from MMC Dennis Hamlin at Norfolk Naval Air Station in Virginia. Chief Hamlin disagreed with a statement we had made about motorcycle crashes. We called Chief Hamlin to discuss the difference of opinion and found out that he is chief instructor at the Norfolk NAS motorcycle school. Also, that he was conducting a school that was a little bit out of the ordinary in that it covered the subjects that we here at DRIVER had thought to incorporate in our "additional training" list.

The more we thought about it, the better Chief Hamlin's course sounded. So off we went to Norfolk to take a look. What we found was a motorcycle

continued

DRIVER

THE TRAFFIC SAFETY MAGAZINE FOR THE MILITARY DRIVER

JANUARY 1977

VOLUME 10 NUMBER 8

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THE EDITOR SPEAKS

DOUBLE CLUTCH

One of the articles in this issue is about a new Research Safety Vehicle that uses some remarkable electronics to provide accident-protection. If you read the story you may be left wondering why the Detroit automakers aren't experimenting with these sophisticated ideas. Well they are, but they don't say much about it to the public.

A General Motors executive recently told a meeting of the Society of Automotive Engineers that existing radar braking systems are experimental and costly, and lack good discrimination between obstacles that are dangerous and non-dangerous. But he conceded that such systems could be feasible in the next 10 years. General Motors already has evolved several generations of an electronic system that would prevent drunk drivers from operating their cars, but the giant automaker feels the cost-effectiveness must be improved before the system has a chance of getting on production models.

It's important to understand that when Detroit says cost-effectiveness, they're talking about the extra dollars the consumer ends up paying for the car. When the RSV people in our article talk cost-effectiveness, they are talking about the dollars American society as a whole pays for traffic accidents—hospital costs, repair bills, disability expenses, insurance, lost work time, and on and on.

There is no doubt in anybody's mind that technology has enhanced the safety of the automobile in the past 20 years. The Government Accounting Office estimates that between 1962 and 1970 improvements made to better the occupant safety of the passenger car "increased accident survival by 25% or more." And occupant fatalities have been going down steadily since 1969.

However, there are many people who do not favor trying to cure all safety problems via technology. After all, they say, the most significant breakthrough for reducing fatalities had nothing to do with technology. It was the 55 mph speed limit.

course that provided good info to newer riders, didn't insult more experienced riders, had all the tips we were trying to spread, and that didn't make bike riders feel that somebody was down on them.

We also found that the course could be given anywhere by a person with minimal riding experience but who had good communications skills.

In short, what follows is an overview of Chief Hamlin's course as taught at Norfolk NAS, and we think that IF your base has a person who is a rider and who communicates well, and IF base motorcycle registration is *not* predicated on taking this extra portion, that the addition of this information to MM12 or whatever is your base's formal course will save lives and make good riders better riders:

1. Introduction; reason for course, no testing required, outline course content.

2. Motorcycle inspection (See Fig. 1) (p. 6-7).

3. Rider inspection; Head and eye protection, gloves, boots?

4. Go over inspection results; point out reasons for "gigs."

5. Quickly go over state laws and base regulations (this material can get pretty boring, so don't go into too much detail).

6. Road Hazards:

A. *Rain grooves* make bike feel unstable, need light touch with handlebars, slow down.

B. *Steel bridge gratings* . . . consider stopping and walking bike across; area outside of tire tracks may be a little rusty and offer more traction.

C. *Cattle guards* (series of rails or tubes across the road) should be taken at 90 degree angle, same as railroad tracks.

D. *Gravel* in a corner or at stop sign can put you on your ear.

E. *Water* will cause hydroplaning, can hide holes in road.

A thorough pre-ride inspection is important. Go over this inspection a few times with newer riders . . . sometimes they know enough to check, but not what to check *for!*

F. *Bridges* may be covered with "black ice" when road is clear and dry.

G. Watch for pedestrians at *overpasses* . . . they think it's fun to throw things at you.

H. *Dogs* aren't interested in getting in your spokes . . . increase throttle and ride away. Don't kick at dogs unless you like to fall down.

I. *Cross winds* become apparent when you leave a grove of trees, or the shelter of buildings. Trucks create crosswinds and severe buffeting.

7. Special hazards:

A. *Engine seizure;* will lock rear wheel, first move is to pull in clutch. Get to side of road, let cool, troubleshoot.

B. *Chain failure;* may destroy primary gear case or may lock rear wheel. If chain flies off, check to see that a following rider hasn't been injured.

C. *Electrical failure;* not too bad during daylight, but nightime failure will increase your pucker factor by 100%. (DRIVER, Dec '75)

D. *Blowout;* clutch in, little or no braking, coast to side of road.

E. *Recently repaired bike;* your friendly mechanic may have readjusted your clutch or brakes. Try controls before riding a newly repaired bike.

F. *Borrowing* or loaning a bike; DON'T.

8. Protective clothing can and will save your bacon. Eye protection is especially good for *preventing* accidents, while other clothing can prevent injuries resulting from an accident.

9. Rider visibility: emphasize headlight-on, reflective or bright clothing, reflective tape, etc.

10. Emphasize that regs permitting the use of civilian protective equipment while in uniform are privileges and should not be abused. Regs apply while riding only; when you dismount, remove the non-uniform attire.

11. 90% of safe biking is preventing accidents by being alert, aware, and taking necessary corrective actions.

12. Other 10% is maintenance. (Take all the time you need with this portion . . . newer riders don't even know what questions to ask so really go into detail.)

A. Plugs:

New ones aren't always correctly gapped.

Explain heat range and how to select correct one.

Cleaning; entire plug to prevent voltage runoff.

Filing; sharp edge principal.

Gapping; wire gauge only . . . not feeler gauge.

Installation; proper torque vs aluminum heads.

Helicoils and other thread inserts in case of thread stripping.

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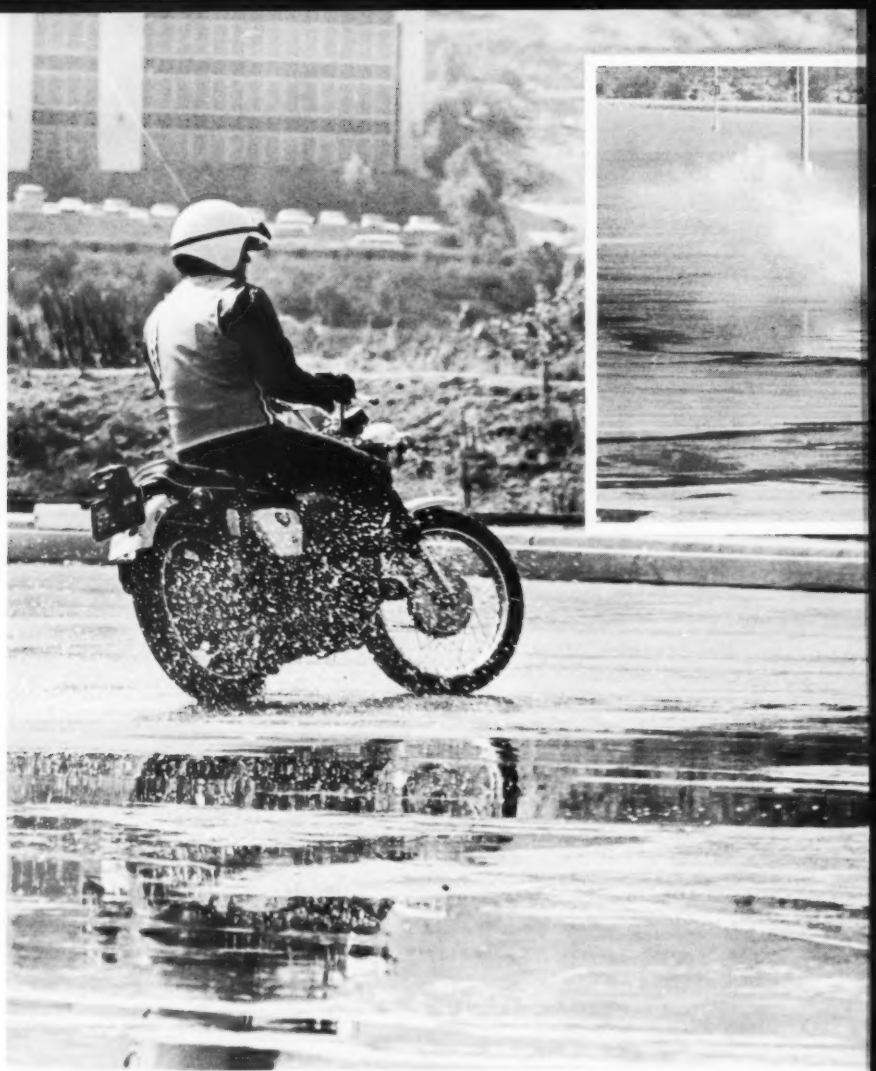
WHY DON'T WE DO IT THIS WAY?



Motorcycle instructors shouldn't forget to cover riding on wet surfaces. Standing water not only means hydroplaning, it can also hide "elephant traps."

B. Chain:

Lube after every full riding day.

Monthly lube should include removal and soak.

New chain stretch check every 50 miles until 500.

Chain worn if it can be pulled more than ¼-inch from sprocket.

Proper chain tension check . . . weight on bike.

Proper master link orientation.

Use of chain breaker.

C. Spokes:

Check axial runout.

Spoke tension check with pencil (demonstrate).

Spokes can damage inner tube.

D. Adjustments:

Do your own so you won't get stranded.

Brakes.

Clutch.

Throttle.

Oil pump (two-strokes).

Chain (it won't hurt to cover chain adjustment again).

Headlight aim.

Front fork fluids (vary weights to vary ride, ATF, etc.).

Rear shock preloading for different conditions.

E. Battery; use distilled water only, check connections often.

F. Horn; consider installing aftermarket air horn. Explain how water gets into horns, causes failure.

G. Tires; 1/16-inch tread depth minimum.

H. Cables:

Rust prevention foremost.

Try teflon-lined cable sheaths.

One broken strand can cause the cable to hang up.

I. Bits and pieces;

All light bulbs.

Cotter pins (particularly those on torque arm and axle retainers).

Nuts and bolts (paint reference line on nuts for visual checks).

Swing arm and bearings.

Instruments.

Seat attach bolts or pins.

Sissy bars, saddlebags, crash bars, etc.

Oil change intervals for both engine and front forks.

Tune up intervals.

J. Tool use;

Difference between Reed & Prince and Phillips heads.

Replace with Allen or hex-head bolts and screws.

Use of soft hammers on aluminum.

Transistor radio as tuning aid.

Torque wrench biker's best friend.

K. Emergency tool kit and tool tricks:

Small knife.

Fingernail file or emery board. Bobby pins with paint removed.

Emergency point and plug gap . . . ID card is .018-inch at outer edge, .023-in. ¼-in. from edge.

Dimes and quarters can make good screwdrivers.

Water also means trouble if you've got to stop in a hurry. In this case, crash is inevitable and rider is going to go down. Second pic shows what most consider proper procedure . . . get away from the bike (more in text).

Nail polish can seal ignition in a pinch.

Directional signal bulbs can sometimes be used to replace burned-out headlight bulbs.

In case of ignition failure, don't forget to check coil primary and secondary leads (under gas tank) for inadvertent grounding.

13. Sissy bars: they may look good and help a passenger to ride more comfortably, but they can also be a hazard. With a load tied to the sissy bar the center of gravity is raised and can play tricks with the handling. Sissy bars can also make exiting the bike somewhat difficult in the event of a crash.

14. Riding two up: instruct your passenger about his or her duties. Check foot pegs, tire pressure, and shock absorber pre-load. Also remember each bike has a weight limitation (example: 750 Honda, 330 lbs.) and two people plus camping gear may exceed the limit. Children should not be carried unless they are old enough and big enough to ride behind you . . . carrying the kiddies on the tank is *completely unacceptable*.

15. The inevitable crash: This is a biggie, so let's establish some parameters; you are riding alone on a two-lane, two-direction road. As you near a 4-way stop sign, you see that the turkey in the 68 Chevy entering the intersection from the right just blew his stop sign. You *are* going to crash, it's unavoidable. What are you going to do?

continued

Just get your bike out of the shop, or did your buddy just return yours? Check out those controls . . . mechanics and friends have a habit of adjusting controls to *their* preference, leaving you with a quick clutch you didn't have before. Throttle response may be different too.

If you don't have a motorcycle instructor on base, how about asking the local police, sheriff, or highway patrol? These organizations usually have trained people available to help out in such situations.

Fig. 1(a)

MOTORCYCLE SAFETY INSPECTION

ITEMS CHECKED	POSSIBLE	DEFECTS		SAFE	UNSAFE
BRAKES	REMOVED	POOR ADJ.	DISCONNECTED		
CONTROL LEVERS	BROKEN	BENT	NONE		
STEERING	EXTENDED FORKS	ANGLE CHANGED	BEARINGS LOOSE OR WORN		
FOOT RESTS	TOO HIGH	LOOSE			
HORN	NONE	NOT AUDIBLE			
MIRRORS	NONE	DEFECTIVE	NO SIDE VISION		
MUFFLER	NONE	NOISY	LEAKY		
HANDLEBARS	HIGH	LOOSE	BENT		
TIRES	FRONT REAR UNEVEN WEAR	CORD	SMOOTH		
HEAD LIGHTS	HIGH 1 OUT LOW	2 OUT	BAD FOCUS		
SEAT	HIGH	LOW	LOOSE		
TAIL LIGHTS	NONE	1 OUT			
LICENSE LIGHTS	NONE	1 OUT			
STOP LIGHTS	NONE	1 OUT	LENS		
CHAIN/SPROCKETS	LOOSE	TIGHT	WORN		
CABLES	WORN	STIFF	BROKEN		
WHEELS	OUT OF ALIGNMENT	IMPROPERLY SECURED	BROKEN, BENT OR LOOSE SPOKES		
SUSPENSION	IMPROPERLY MODIFIED	BENT/WORN LEAKING FLUID	BROKEN/MISSING COMPONENTS		
FUEL SYSTEM	IMPROPERLY SECURED	LOOSE FITTINGS	LEAKS		
THROTTLE	BINDING	BROKEN			
ENGINE KILL SWITCH	INOPERATIVE	MISSING			
SISSY BAR	LOOSE	NOT PROPERLY SECURED			
CLUTCH	DRAGGING	SLIPPING			
FRAME	BENT/DAMAGED	CRACKED			
RIDING EQUIPMENT					
HELMET	UNAPPROVED TYPE	WORN STRAP SECURING DEVICE	IMPROPERLY MODIFIED		
EYE PROTECTION	NON SHATTERPROOF	SCRATCHED/BLURRED EYE PIECES	INSUFFICIENT EYE COVERING		
OTHER: CURRENT STATE INSPECTION STICKER					
INSPECTED BY:					

continued

WHY DON'T WE DO IT THIS WAY?

After you've put this image in the "students" minds, have a discussion period and evaluate all ideas. Some people will want to stay with the bike and launch themselves over the car . . . others will want to lay the bike down and slide into the car . . . and a third group may want to lay the bike down and then get away from it.

All you should do is point out the injuries that can result from each course of action, and then add that DRIVER magazine endorses the third one. We feel that chances of serious injury are lessened because the chance of impacting the vehicle is lessened. A bike will slide pretty far, and if you stay with it you'll go as far as the bike. If you lay it down and then get away, you probably won't slide as far and will have a better chance to escape impact. If you are wearing the corrective protective clothing (not blue jeans, which will catch on the pavement) you will not go into a tumbling, flailing slide, but rather a controlled slide on your rump and upper back. DRIVER feels that raspberries are infinitely preferable to impact injuries.

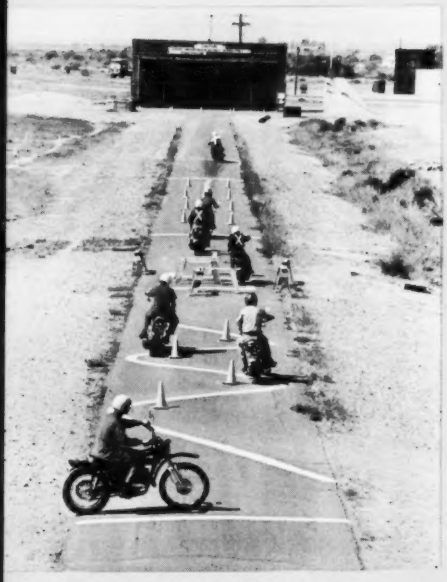
Again, emphasize that the choice of actions is up to the rider, and each and every potential crash should be considered on it's own merit.

A NOTE FROM DRIVER

We're sure that most people will have something to add to this overview, and we feel that any good info that is disseminated to the riders will be a benefit.

Again, let us emphasize that the foregoing is not intended to be mandatory for base licensing. but is suggested

This is what a good motorcycle course is all about. Riders should be aware that they can and will be victimized if their attitudes and skills are not in tune with their surroundings. Armed Forces motorcycle courses are not designed to harass riders, but to prevent this type of incident.



If your installation has the space, a riding course isn't a bad idea. It can show riders that there may be certain areas of their riding skills that need improvement, and newer riders can benefit from watching the old pros ride.

only as an addition to current mandatory training. We hope that if you have the personnel to deliver this "lesson" you will seriously consider adding this or similar material to your motorcycle safety program.

If your base already has a similar program and you have additional points you bring out, we'd like to hear about it.

Just remember, motorcycle safety training is not given to harass riders, it's given to save lives.

Fig. 1(b)

SUGGESTED DAILY/WEEKLY MOTORCYCLE INSPECTION

COMPONENT	CONDITION TO CHECK		DAILY	WEEKLY
TIRES	PRESSURE	WORN FOREIGN OBJECT	X	X
WHEELS	BENT DENTED MISALIGNED	SPOKES LOOSE/BROKEN	X	X
BRAKES	ADJUSTMENT	OPERATION	X	X
SUSPENSION	BROKEN, WORN BENT	LEAKING FLUID	X	X
HEADLIGHT	OPERATION	ADJUSTMENT	X	
TAIL, BRAKE & SIGNAL LIGHTS	OPERATIONAL	ADJUSTMENT	X	
FUEL SUPPLY			X	
OIL SUPPLY			X	
ALL NUTS AND BOLTS				X
MIRROR	LOOSE	ADJUSTMENT	X	
HORN		OPERATION	X	
CHAIN	WEAR AND TENSION	LUBRICATION	X	
CABLES	WEAR AND ADJUSTMENT	LUBRICATION	X	
CONTROL LEVERS	ADJUSTMENT	OPERATION	X	
SEAT, WINDSHIELD GAS TANK	PROPERLY SECURED	ADJUSTMENT	X	X
FUEL FILTER	CLEANLINESS	TIGHTNESS		X
SWING ARM	BUSHING WEAR	LUBRICATION		X
ENGINE TRANSMISSION	OIL LEVEL	OIL LEAKS	X	
SPARK PLUGS	CONDITION	PROPER GAP		X
IGNITION POINTS	CONDITION	PROPER GAP		X
WIRING	FRAYED	LOOSE CONNECTIONS		X
SPROCKETS BATTERY	WEAR CONNECTIONS	ALIGNMENT WATER LEVEL		X X

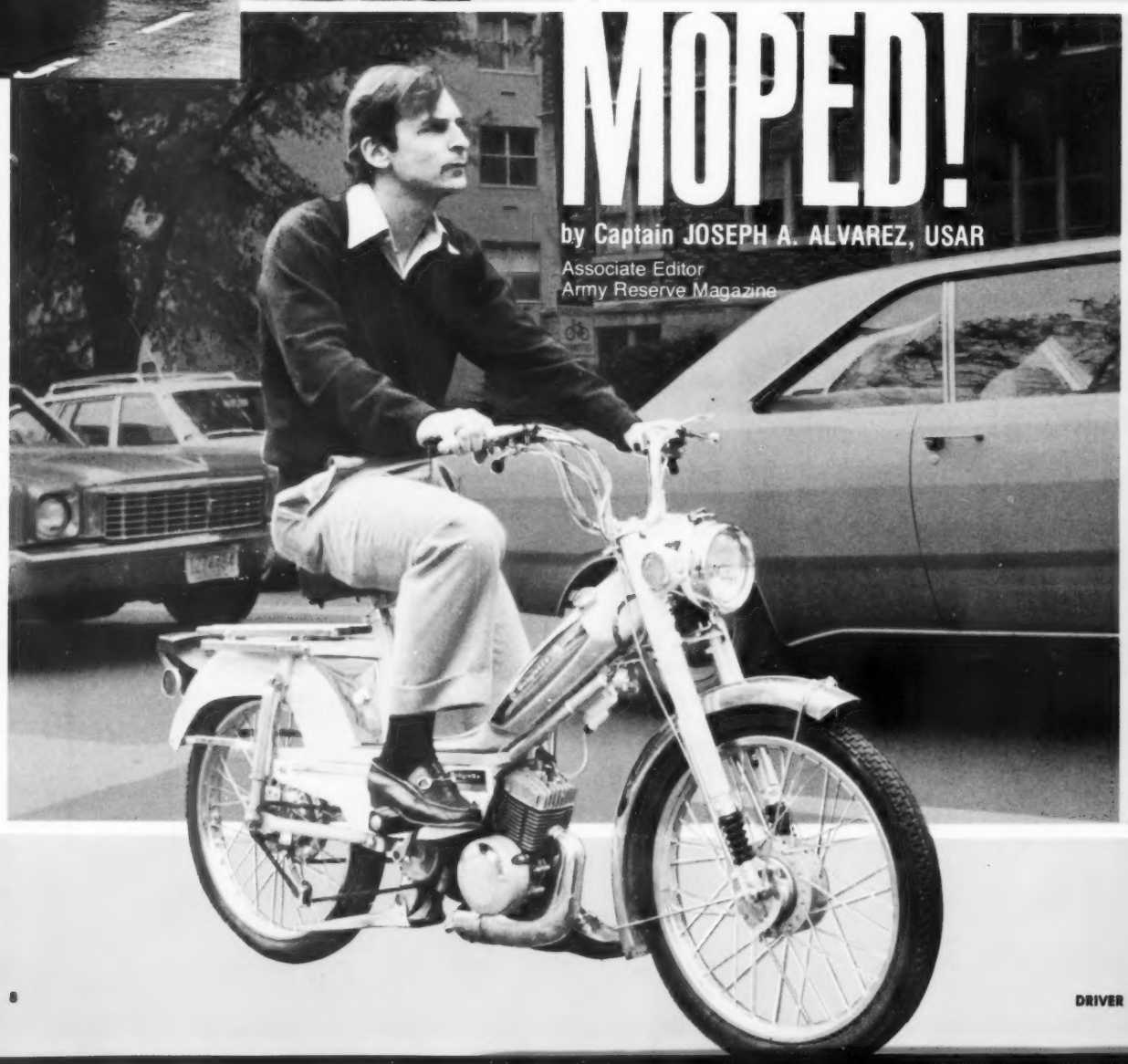
IS IT A BICYCLE? IS IT A MOTOR-CYCLE? **NO, MAN, it's**

MOPED!

by Captain JOSEPH A. ALVAREZ, USAR
Associate Editor
Army Reserve Magazine

They're not really bicycles, even though every one of them has two wheels and pedals. They're not really motorcycles, even though they all have motors. Motorized bicycles or mopeds—for motor pedal machines—are a compromise between human and engine-powered two wheelers.

High, Low. For those concerned about economy of operation, the mopeds are good investments because, depending on the model, they get between 120 and 200 miles to the gallon of fuel, a result of small 50 cc engines which usually produce less than 1.5 horsepower. That means low maximum speeds—from 18 to 28 mph—varying according to the laws of the states where mopeds are sold. Maximum speed in North and



South Carolina, Virginia, Texas, Ohio, and Michigan is 20 mph, while in Hawaii, Indiana, and Maryland there is no separate speed limit. (See chart for additional details of state laws.)

Most mopeds can't meet the strict safety standards required for motorcycles, including the required amount of candlepower in the stop lights, fade recovery requirement for hydraulic brake systems, and the placement of the rear brake controls. So they're mostly sold in the 20 states which currently have laws defining mopeds as bicycles, freeing the buyer from registering and insuring the vehicle or getting a license to drive it. Two more states have passed laws that take effect in 1977. A manufacturers' trade group, the Motorized Bicycle Association, is trying to persuade the rest of the states to pass moped definition legislation so that the machines can be sold throughout the country.

The moped, that fancy little motor-assisted bicycle so popular in the rest of the world, is finally becoming a hot item here at home. The question is, how will the states classify it for traffic and safety purposes? Here's the latest information.

Mopeds come in two basic designs, both functions of the engine placement: the older style has the motor mounted above the front wheel, while the newer ones mount the engine under the frame, like a motorcycle, in front of the pedals.

They weigh from 70 to about 100 pounds, two to three times the weight of most bicycles. The engines, smaller than those on most powered lawnmowers, are two-stroke types, which means mixing oil and gasoline in the correct proportions. With their automatic trans-

continued

STATE MOPED LAWS

STATE	VEHICLE				DRIVER			
	cc limit	max power	max spd.	regis.	min age	license	insurance	helmet
Arizona	50	1.5 hp or less	25 mph	yes	16	any valid	no*	no
California	none	less than 2 gross hp	30	bicycle	15	any valid or learner	no*	no
Connecticut	less than 50	2 hp	30	no	16	any valid	no	no
Florida	none	1.5 hp	25	no	15	no	no	no
Hawaii	none	1.5 hp	none	no	15	no	no	no
Indiana	none	less than 1 hp	none	no	none	no	no	no
Iowa	50	none	25	yes	14	any valid or moped	no*	no
Kansas**	50	1.5 hp	25	yes	14	any valid or written	no*	no
Louisiana	50	1.5 hp	25	no	15	any valid	no	no
Maryland	less than **or** 50	less than 1 hp	none	no	16	any valid	no	no
Massachusetts	50	1.5 hp	25	yes	16	any valid or learner	no	no
Michigan	none	less than 1 hp	20	no	15	no	no	no
Nevada	none	none	30	no	16	any valid	no*	no
New Hampshire	50	2 hp	less than 30	yes	16	any valid	no*	no
New Jersey***	less than 50	1.5 hp	25	no	15		no	no
North Carolina	none	less than 1 hp	20	no	16	no	no	no
Ohio	none	less than 1 hp	20	no	none	no	no	no
Pennsylvania**	50	1.5 hp	25	yes	17	yes	no*	no
Rhode Island	none	1.5 hp	25	yes	16	any valid	no	no
South Carolina	none	less than 1 hp	20	no	none	no	no	no
Texas	less than 60	none	20	yes	15	yes (written)	no	no
Virginia	none	less than 1 hp	20	no	16	no	no	no

*Financial responsibility required. **Law effective 1 Jul 77.

***The New Jersey Senate last fall approved a bill that would ban mopeds on most highways with a speed limit of more than 40 mph; restrict operation of mopeds to people 17 or older who have a driver's license; require the reporting of moped accidents; and require owners to carry liability insurance. In the 12 months after mopeds were legalized in that state in October 1975 there were nearly 150 crashes, three fatalities, and 26 injuries requiring hospitalization.

Courtesy Motorized Bicycle Association, Washington, DC

IS IT A BICYCLE?
IS IT A MOTOR-CYCLE?
NO, MAN,

it's a MOPED!

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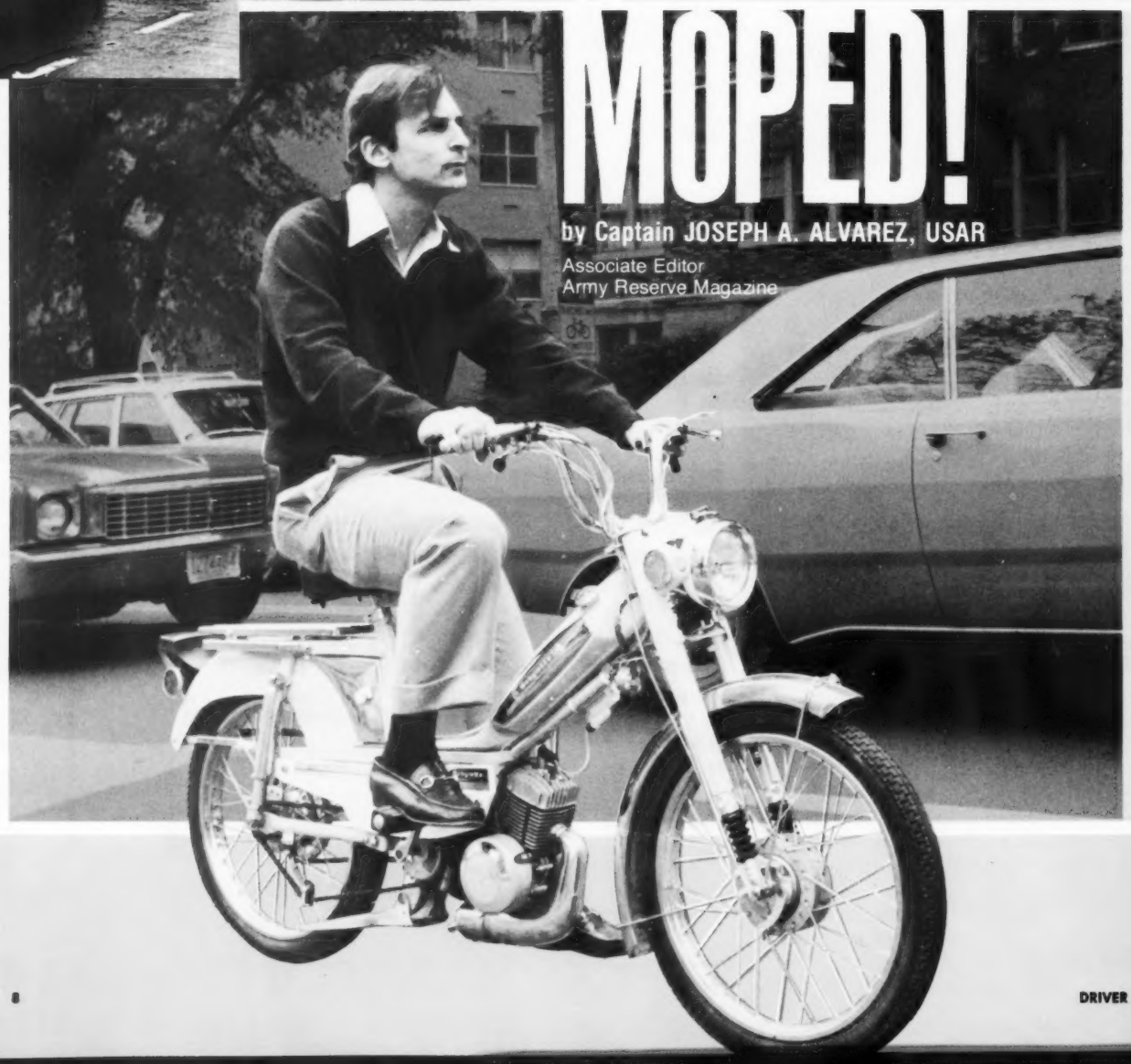

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	cc limit	max power	max spd.	regis.	min age	license	insurance	helmet
Arizona	50	1.5 hp or less	25 mph	yes	16	any valid	no*	no
California	none	less than 2 gross hp	30	bicycle	15	any valid or learner	no*	no
Connecticut	less than 50	2 hp	30	no	16	any valid	no	no
Florida	none	1.5 hp	25	no	15	no	no	no
Hawaii	none	1.5 hp	none	no	15	no	no	no
Indiana	none	less than 1 hp	none	no	none	no	no	no
Iowa	50	none	25	yes	14	any valid or moped	no*	no
Kansas**	50	1.5 hp	25	yes	14	any valid or written	no*	no
Louisiana	50	1.5 hp	25	no	15	any valid	no	no
Maryland	less than **or** 50	less than 1 hp	none	no	16	any valid	no	no
Massachusetts	50	1.5 hp	25	yes	16	any valid or learner	no	no
Michigan	none	less than 1 hp	20	no	15	no	no	no
Nevada	none	none	30	no	16	any valid	no*	no
New Hampshire	50	2 hp	less than 30	yes	16	any valid	no*	no
New Jersey***	less than 50	1.5 hp	25	no	15		no	no
North Carolina	none	less than 1 hp	20	no	16	no	no	no
Ohio	none	less than 1 hp	20	no	none	no	no	no
Pennsylvania**	50	1.5 hp	25	yes	17	yes	no*	no
Rhode Island	none	1.5 hp	25	yes	16	any valid	no	no
South Carolina	none	less than 1 hp	20	no	none	no	no	no
Texas	less than 60	none	20	yes	15	yes (written)	no	no
Virginia	none	less than 1 hp	20	no	16	no	no	no

*Financial responsibility required. **Law effective 1 Jul 77.

***The New Jersey Senate last fall approved a bill that would ban mopeds on most highways with a speed limit of more than 40 mph; restrict operation of mopeds to people 17 or older who have a driver's license; require the reporting of moped accidents; and require owners to carry liability insurance. In the 12 months after mopeds were legalized in that state in October 1975 there were nearly 150 crashes, three fatalities, and 26 injuries requiring hospitalization.

Courtesy Motorized Bicycle Association, Washington, DC

continued

IT'S A MOPED!

missions, mopeds have no clutches to operate or gears to shift. The drum brakes work with handlebar levers, just like 3- and 10-speed bicycles. While a number of mopeds have hydraulic fork suspensions, the less expensive models still have the standard bike frame with extra springy seats.

Cheap? Though economical to run, a moped—with a $300 to $500 price tag—isn't exactly a giveaway. For $300, you get the basic bike frame with front-mounted engine. As the price goes up, the mopeds add luxuries like a speedometer, motorcycle suspension, turn signals, a battery—to keep lights and turn signals operating while the motor idles—steering head lock, and stainless steel or chrome fenders.

Pedal Power. Starting the engine on a moped is like push-starting a car: get up speed, engage the motor, and—Eureka!—the motor buzzes into action. To get up speed of course means pedaling. The only difference between starting front-engine and mid-frame-engine mopeds is that the front engine requires pushing a lever to engage the motor while the mid-engine needs only a flick of a switch.

The front-engine drives the wheel by direct contact with the tire, which can cause premature tire wear. The mid-engine drive is usually a chain-gear combination, although some mopeds use belts or friction drives on the rear wheel.

Pulling away from a complete stop can try a person's patience since the mopeds usually don't have enough power to reach cruise speed right away without some fancy pedaling. Steep hills may also require leg power.

Caveat. There are more serious problems, however. Mopeds are as easy to steal as bicycles so adequate theft protection is a must. Mopeds are not dirt bikes; they just aren't built to plow through sand and mud. Maintenance can be a headache and, while less complex than motorcycle or car upkeep, don't think it's as simple to maintain a moped as a bicycle.

Riding safety worries some potential moped buyers. Most states don't require helmets or protective clothing—trousers and long sleeve shirts made of sturdy material—but the safety-conscious rider should be concerned. (Air Force requires moped riders to wear a helmet on Air Force bases.) Most car drivers aren't used to moped traffic, so driving a moped means driving defensively and watching out for car doors opening and poor road conditions, things that normally wouldn't be alarming to car drivers.

U.S. accident statistics are incomplete because there are so few mopeds on the road. In Europe, however, where there are some 15,000,000 of them, fatal accidents occur at six times the rate for bicycles, although still less than one-third the rate for motorcycles.

If you've been bitten by the bug and want to hear the buzz of a moped instead of the roar of a motorcycle or the hum of a car, you'll have to decide for yourself whether these machines suit your needs. The industry expects sales in the millions by the early 1980s as roads continue to choke up with traffic and exhaust fumes and as the cost of gasoline continues to go up. Just hope for flat terrain and a short rainy season.

THE DRIVERS

A lot of our driving is done strictly by habit—reaching for the light switch, activating the turn indicator, putting the transmission lever in Reverse. All these things and a lot more are done with no conscious thought on our part. That's why you should take a minute or two for a cockpit check of a car you're going to drive for the first time.

Be especially alert if you're going to drive a car with a clutch but are used to an automatic transmission and have developed the bad habit of braking with your left foot. Otherwise it might be panicsville when neither foot can find the brake pedal.

LINDA SMITH **LARRY RANDLETT**

Sales boom to continue as recreation vehicle industry reacts to consumer demands for more safety features

REC

Sales of recreation vehicles, hard-hit by the energy crisis in 1973-74, have rebounded so spectacularly in 1975 and '76 that the RV industry forecasts even greater growth through 1980. Sales in 1977 alone are expected to total nearly 600,000 units, including travel, fifth-wheel, and camping trailers, truck campers, van conversions, and three types of motor homes.

DRIVER recently attended the largest RV show west of the Rockies, held in and around sprawling Los Angeles Dodger Stadium. We came away impressed – not only by the many luxuries and comforts incorporated into today's RecVees but also by the RV industry's greater awareness of consumer demands for safer vehicles. You not only can buy a better designed and built unit today from most of the 500 RV manufacturers in the United States and Canada, you also have a longer list of optional safety equipment items to choose from.

Rising RV prices don't seem to be scaring away buyers; neither are increasing gasoline costs. Doug Toms, president of the Recreation Vehicles Industry Association, told DRIVER he personally doesn't expect the nation to face another fuel shortage in the next 30 to 50 years because of the many uptapped sources of oil now being explored.

Toms also predicted continuation of the 55-mph speed limit and increased sales of small travel and camping trailers to keep pace with Detroit's production of smaller cars. This doesn't mean, he added, that the present booms in motor homes, larger trailers, and van conversions won't continue, too.

Brand or company names and products mentioned or pictured do not represent endorsement by DRIVER or the U.S. Air Force

(below)
Prowler, the nation's No. 1 selling travel trailer, is built in eight models from 17 to 31 feet in length, including a new bunkhouse model. The bunkhouse is a separate front room useable for sleeping, an on-the-road office, dining room, or den. Unseen safety changes include freeze-resistant polybutylene water lines and brass plumbing fittings. A rugged International Scout Traveler makes towing a breeze.

VEES FOR '77

Toyota Chinook with its unique pop-up top offers a new, multi-purpose model with EPA ratings of 28 mpg on the highway and 20 mpg in the city. Added safety features for 1977 include a redesigned rear bumper section for greater load tolerance; a safety net in the cab-over bunk area; an external passenger-assist handle; and high-back bucket seats in the cab.

(right)
The Born Free, a 20-foot detachable coach, is claimed by its maker to be the "safest, best constructed coach ever built" when mounted on a properly specified pickup truck. Its third axle with electric brakes eliminates roadsway and unbalanced rear overhang weight and provides increased braking capacity, tire wear, and blowout protection. Three steel roll bars and tubular steel frame members laminated into a fiberglass body plus steel reinforcing in the cab-over section also provide improved collision protection.

(left)
Explorer offers 77 design changes and engineering advances, including 16 safety improvements, in its 1977 fleet of new mini- and maxi-motorhomes. Included are new seat belts on the couch and dinette for more passenger protection, deadbolt locks on all entry doors, larger front windshields and driver's side windows for better visibility, clearly printed warnings on all fuel-fill locations to prevent costly mistakes, and repositioned headlights for wider visibility at night.

continued

JAMBOREE II

The OLDE STORE

(far left)
The Santana van camper comes in seven floorplans ranging from a basic two-sleeper with galley sink, ice box, and storage cabinet to full self-containment. Some models have enough room for a motorcycle inside. Safety-wise, its aerodynamic fiberglass cap provides extra stability in winds and at highway speeds, also saves on fuel costs. You have your choice of a Chevy, Dodge, Ford, or GMC chassis.

(near left)
The Viking camping trailer is representative of one of today's most popular and least expensive RV models—the pop-up tent trailer. Available in four lengths from 14 to 21 feet, it is ideal for most medium- and compact-car families who like the outdoors. A key safety option is Viking's surge brake system.

(far left)
Avion, noted for its aircraft construction aluminum travel trailers, employs the same nonglare aluminum skin and beefed-up undercarriage support in its mini-motorhomes. Built on a Dodge chassis, the 1977 Avion mini-model is a deluxe RV offering excellent visibility and aerodynamic styling for improved road-handling qualities and fuel economy.

(near left)
Jamboree II is one of 1977's new, small mini-motorhomes designed for couples on a budget. Barely 17 feet long and mounted on a Dodge chassis with a 109-inch wheelbase, it is highly maneuverable and, in spite of its small size, is fully self-contained. It has a 318-CID engine, automatic transmission, and 36-gallon fuel tank.

(far left)
The Midas mini-motorhome comes in five models, two in 19-foot and three in 22-foot lengths, and all boast driving ease and gasoline economy comparable to a station wagon. Each features Thermocore laminated walls, roof, and floor for improved structural and insulating characteristics. Standard safety items include a fire extinguisher; additional seat belts are optional.

(near left)
Tioga II is a relatively unique mini-motorhome with an all-fiberglass body in bold, contemporary styling. Its smart lines and raked profile reduce wind resistance on the highway and help to keep fuel bills down. Tioga II is designed primarily for two-person, self-contained travel.

(far left)
Free Spirit travel trailers are manufactured in Indiana, Texas, and California in 17- to 32-foot models. The 17, 18-, and 19-foot styles can be towed with compact cars. Priced in the low-to-medium range, the attractively decorated Free Spirits incorporate several extra safety features both in their construction and tow-ability.

(near left)
Holiday Rambler's luxurious, new T-27 mini-motorhome is 27 feet long with a six-wheel, tandem rear axle suspension. Providing a smoother ride and safer handling characteristics, its MOR/ryde suspension uses a system of solid-rubber-block springs sandwiched between metal plates instead of conventional steel leaf springs. The extra axle also produces a Type C motorhome on a mini-motorhome chassis.

The Sunrader camper is unique in that almost the entire rear end of this reinforced fiberglass unit opens upward to support a standard-equipment, fold-up sun porch. You can also leave the end down and use its built-in back door. Built for long and short bed pickups, both domestic and import models, Sunrader comes with a variety of standard and optional safety equipment.

Terry, one of America's oldest names in travel trailers, has been redesigned inside and out for 1977. A new, rounded profile is achieved through radius corners on both the body and windows of eight different models, as well as on two fifth-wheel models, ranging from 19 to 30 feet in length. A rugged chassis and tandem suspension system provide improved roadability.

SENSIBLE SAFETY

Is it in your future?

This is Minicar's assembly plant. Although the RSV is not in production, developmental work, including crash testing, calls for about 25 vehicles. The unusual gull-wing doors are visible on the car in front.

Bring up the subject of government-sponsored "safe" cars and most people get a mental picture of something that looks like an Army tank and is about as much fun to drive. Automobile lovers still get red in the face when they recall the government's early effort toward producing a crash-worthy car. "Three-ton padded cell" is the kindest description. To say nothing of the fact that high initial cost plus a combination of weight, pollution control and aerodynamics has made the few running examples snail-slow and impossibly expensive to operate.

Of course, we Americans believe in traffic safety. But not if it means sacrificing comfort and convenience. Or styling. Or performance. Or emphatically not if it's going to cost money. Almost 20 years ago, Ford Motor Company made some surveys and decided that car buyers were interested in crash-protection. So Ford made safety equipment available as extra-cost options. Did people rush right out and buy? Not on your life. People might have been *interested* in safer cars but they wouldn't pay for them. Ford soon announced that it had tried and couldn't sell safety to the American motorist. If the demand for optional air bags on some luxury models today—or more precisely the *lack* of demand—is any indication, safety is still a big ho-hum to most car buyers if it's going to add to the sticker price.

Nevertheless, the government, specifically the National Highway Traffic Safety Administration (NHTSA), is hanging in there. The $40 billion a year that traffic accidents cost American society cannot be tolerated forever. Especially since the inevitable turn to smaller cars by 1980 (because of mileage requirements) is going to send the cost figures even higher. That's because smaller cars experience more damage in crashes, their occupants more serious injuries, than standard cars. The small car offers less frontal crush length than larger autos, and less interior distance over which a re-

straint can work to safely decelerate an occupant.

So . . . what's the government to do about the price America pays for traffic accidents? The average motorist is not much interested in improving his driving skill, doesn't wear his seat belt, and exceeds the speed limit when he feels like it. It's full-circle back to the only idea that seems to have a chance: Build a safer car.

Does that mean a three-ton padded cell is the car in your future, like it or not? No, it doesn't.

The car of the 1980s well may be a kissing cousin of a research safety vehicle (RSV) lately developed by Minicars, Inc., of Goleta, California, working under a contract from NHTSA.

The first thing Minicars did was spend months analyzing data on automobile accidents. They wanted to know where costs were coming from and how they could be reduced. They committed themselves to a benefit/cost methodology. That is, no matter how great an idea seemed, the final test was whether it would save society enough to warrant the cost. If the benefit didn't exceed four times the cost, it didn't go in.

An example makes this clearer: Minicar's studies showed that the most cost-effective single thing that could be done to any car was to put in an airbag for the driver. The driver is always there, he's always in position, and he's always an adult. Now the front passenger gets great protection from an airbag, too, but he's there only half the time and sometimes he's a child who's the wrong size for the bag. The benefit/cost tradeoff isn't nearly so good.

The accident studies showed that rear passenger injuries are so infrequent as to make the most cost-effective measure no protection at all. (In this case, however, belts go in anyway.)

Where are the accident costs coming from? Basically, the bulk of the personal injury and property damage from crashes comes from frontal collisions, both head-on and from the side. While the greatest number of injury accidents occur at speeds around 30 mph, the

continued

continued

SENSIBLE SAFETY—IS IT IN YOUR FUTURE?

(right)
No ordinary store-window dummies, these fellows are called "anthropomorphic" and can measure the injury-producing forces that a human being would have experienced in the crash.

(below)
Crash tests such as this are run with a full complement of on-board instrumentation and high-speed cameras. Here the RSV sustains extensive controlled crushing of the front-end structure as it impacts a rigid barrier at 50 mph. Minor deformation occurred in the occupant compartment; "injuries" were substantially below the allowable level.

most severe (therefore most costly) occur at higher speeds up to 50 mph.

Safety was not Minicar's single goal. They wanted to design something whose cost in mass production would be competitive with the popular cars in its class and with styling advanced enough to appeal to the 1980's car buyer.

Minicar's president, Donald Friedman, was formerly head of the Commercial Projects Department at the GM Research Laboratories and he knows the American motorist. Says Friedman, "We have to make the safety aspects marketable on other grounds than safety. For instance, at nominal cost we can include a radar system that measures the range and closing rate of other cars and sounds a buzzer when you're too close—but people won't buy it; they don't like to be told they're not paying attention. But if we hook it into the cruise control and sell it as a 'smart' cruise control, they'll love it."

The Minicar engineers knew they could do a lot more than just improve occupant survivability. They could reduce the cost of accidents by improving the braking, both with respect to braking deceleration and frequency of applications. They could even reduce the number of high-speed accidents involving drunk drivers (yes, it's within the state of the electronics art). But how many features or combinations should be built into the car? And how good should the performance be? Minicars put together a lot of different combinations of structural designs, restraints, braking options, etc., and figured cost and benefit. Then they tried different combinations in the traffic mix (varying sizes of vehicles on the road) to see how much good each did. Of course this was all done analytically and not in actual cars. Finally, they settled on the most important features and designed the car.

Built on a 104-inch wheelbase, the unitized construction of the vehicle provides inside space comparable to the Ford Maverick or Chevrolet Nova, although it is only slightly heavier than a Honda or Chevette. Entry is provided by large, counter-balanced gull-wing doors. Airbags protect front-seat occupants, lap and shoulder harnesses are in the rear.

The secret to the RSV's crash survivability and 2,000 pound weight is the car's large-section, thin-wall steel body structure, filled with crushable polyurethane foam. The foam does more than act as a shock absorber. It also braces the bodywork, allowing the use of thinner sheetmetal. The metal carries the load but is stabilized by the foam.

The foam, incidentally, can improve the safety of existing automobiles. Minicars stuffed foam under the front of a Pinto and did a series of crash tests which showed that the car could easily be made to protect the occupants in a 50 mph barrier crash with negligible weight increase. The 200 pounds of foam used in the Research Safety Vehicle now costs $1200 but Monsanto, who makes it, figures it could be down to $1 a pound by 1985.

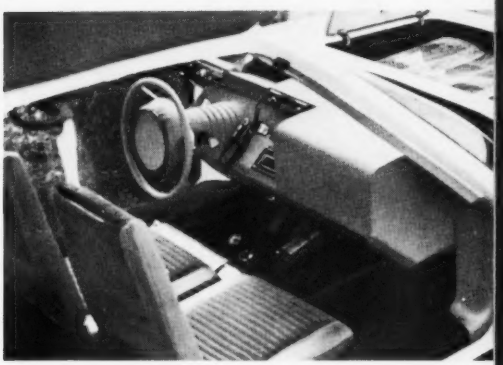
Power is provided by a 1500cc Honda Civic stratified charge engine mounted amidships, with a 5-speed manual transmission. The car should provide 26 mpg city, 37 mpg suburban, and 30 mpg combined fuel economy. Emissions are well below the strictest standards. It has four-wheel independent suspension and other chassis features such as "run-flat" tires, four-wheel disc brakes, and antiskid brake control.

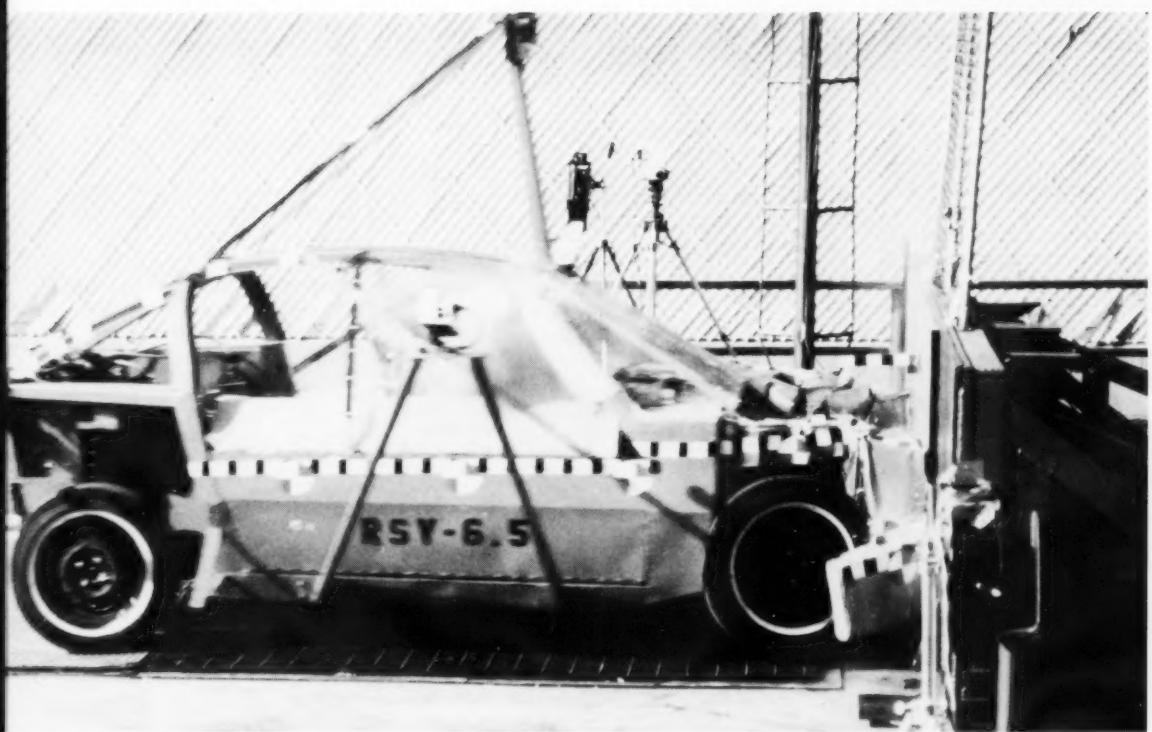
Rather than a conventional sheet metal body skin, the RSV has a flexible plastic "glove" that covers the structure, impregnated with the car's body color and impervious to minor nicks and dings. The soft skin also offers a gentle landing zone for pedestrians who are struck in traffic.

Electronics include a microprocessor-controlled information center. The electronic display will present the standard dashboard information as well as other data such as rate of fuel consumption and engine rpms. Should a malfunction occur, the dashboard will flash warnings such as "Anti-skid System Inoperative" and "Safety System Inoperative."

To avoid collisions, the system includes a microwave radar that will provide audible signals to warn of possible dangerous situations—approaching the car in front too quickly or an obstacle in the road that might be hidden by fog.

In determining the probability of a collision, the microprocessor considers not only the radar return signals, which show the location, speed and direction of other cars and obstacles, but also





the RSV's direction and speed—supplied by sensors linked to the car's steering apparatus and speedometer. If the lights or windshield wipers are on (indicating poor driving conditions), the microprocessor includes this information in continually calculating in thousandths of a second the probability of collisions.

In situations in which a serious crash is unavoidable, the system automatically actuates a special braking system. This system will *not* actuate for low-speed crashes such as those in a parking lot or in slow-moving traffic.

One of the beauties of the microprocessor is that once it is in the car an almost limitless number of functions can be added to it at nominal cost. Right now it controls the radar, applies the brakes, and provides a video display of speed, rpm, fuel, or whatever it's wired to. But it can be used to do nearly anything from metering fuel to switching on the headlights at virtually no extra expense. One of the intriguing uses the Minicar people anticipate is the one we mentioned earlier—detecting driver impairment.

Every driver has a "driving signature," a characteristic way in which we move the steering wheel. The computer can easily be programmed to store and recognize that signature for each driver, then if it varies significantly, the microprocessor will recognize the degree of impairment. It can then be set to limit the vehicle's top speed according to how drunk or otherwise impaired the driver is, and guarantee almost absolute protection while still avoiding that sticky argument about the "right to drive." The microprocessor is expensive now, but Friedman reckons the price could decrease in the same way as digital watches, which only five years ago cost about $2500.

Despite all these exotic components, Friedman believes the car could be mass-produced for about $3500. He doubts it will happen without government prodding. Because the auto companies believe what Ford found out 20 years ago is still true—that safety doesn't sell.

TIMELY TOPICS

Defect Warnings!

National Highway Traffic Safety Administration (NHTSA) is warning owners of 1974 Tri-Sport, 3-wheeled motorcycles manufactured by Alsport Inc., that their vehicles may be subject to wheel separations, chain failures, and control arm separations. NHTSA has received reports from both owners and dealers describing such failures and reporting accidents that resulted in property damage or injuries.

What to do: If you own one of these motorcycles, NHTSA recommends that you return it immediately to your dealer for inspection and corrective action. NHTSA also requests that if you have had problems such as the ones stated above, that you report the circumstances—including the model of the motorcycle, the component that failed, and whether failure resulted in personal injury or property damage—to Office of Consumer Services, N40-41, National Highway Traffic Safety Administration, Washington, D.C. 20590.

NHTSA is also interested in learning whether motorcycle owners are experiencing problems with gas tank filler caps. NHTSA is reactivating its investigation of these caps on Honda motorcycle models CB 350, 450, 500, and 750. This investigation, which had been suspended for some time, has been reopened because of a number of recent reports indicating that dislodging of the gas tank filler cap may result in fuel leakage and the possibility of gas being ignited.

CB OWNERS, BUYERS:

Look Before You Leap

Before rushing out to buy a new CB (Citizen Band) radio or expanding your present system, be advised that Mother Nature may soon make it functionally inoperative and technically obsolete. And you will be able to do little about it.

Moneysworth, a fortnightly national news tabloid, recently headlined a sparsely distributed report by the Federal Communications Commission which says: Beginning late in 1977 and continuing for five years, magnetic changes in the Earth's atmosphere which naturally correspond to the upcoming peak of the 11-year sun-spot cycle will render most CB signals unintelligible and "nearly useless for their intended purpose—directional, short-range communication."

To offset the natural phenomenon, the FCC—which regulates CB policy—reportedly plans to adopt an electronics industry proposal to change the current 27-megahertz wavelength to a higher, sunspot-proof frequency, possibly late this year. Meanwhile, according to an Electronics Industry Association spokesman, introduction of new 40-channel CB radios on January 1 created a strong replacement market for the "old" 23-channel sets of which $2 billion worth were sold last year (double the 1975 volume).

But, says the FCC, "second generation" 40-channel CBs which are supposed to relieve now-rampant congestion on many of the old channels, will be just as susceptible to sunspot interference. Donald L. Lucas, director of the government's sunspot study, explains: Normally, CB radio signals go out in all directions, including straight up and through the atmosphere; however, during sunspot activities, the signal will "skip" or reflect back to Earth at random due to ionization of the atmosphere's F-2 layer, some 150 miles up.

To get around the problem, an FCC special committee "most likely" will present new CB frequency recommendations to the commission by mid-1977. Higher wavelengths being considered are in the Class E Band (220 to 225 megahertz) and the 900 megahertz UHF range. Owners of existing sets and buyers of new CB equipment will be faced with limited alternatives, says the FCC committee chairman: "One, he can continue to use his present CB, although its marginal utility will decline significantly; or two, he can step up to much better service from a higher frequency set, which definitely will be a more expensive unit." *Moneysworth* estimates that 15 to 20 million Americans will be stuck with obsolete CBs within two years.

Right On Red

An interim national policy for establishing right turns on red at traffic signals has been established by the Federal Highway Administration (FHWA). Although all 50 states now have traffic regulations permitting such turns, they vary as to the conditions under which the turns can be made. FHWA has concluded that the right-turn-on-red provision not only reduced delays in traffic and increased intersection capacity but resulted in reductions of fuel consumption and auto emissions. Accidents arising from the practice were insignificant.

Cost of Traffic Accidents

As the year begins, we are hearing a great deal about crime. *U. S. News and World Report* recently published an estimate placing the cost of crime at nearly $90 billion annually. But by examining the details of that estimate, and of a technically similar computation prepared in 1967 for the Katzenbach Commission, you will find that most of the "costs" go to exchanges of money in gambling and other victimless crimes, to losses in white-collar crimes, and to budgets of criminal justice agencies. The direct cost of "serious crimes" is about $5 billion. Contrast that to the annual cost of traffic accidents—$20 billion—and you begin to get an idea of why traffic safety is so important.

There is a common misconception that traffic fatalities, injuries, and costs are incurred by "accidents," whereas crime fatalities, injuries, and costs are inflicted by "offenders." The fact is that at least two-thirds of all traffic deaths result from improper driving.

NO comment

Lessee . . . if one gallon of gas equals 15 sticks of dynamite . . . then 10 gallons would equal . . . trouble! We here at DRIVER all hope we are not in the area when this guy rear-ends a pickup.

Photo courtesy SMsgt Jon Taylor

SHOP-HORSE
Jo

Although the new crop of snowmobiles won't be noted for their high performance, '77 promises to be a great year for those of you who want a great trail machine that's not too expensive, yet capable of more tricks than a beginner can do.

The big news this year is divided into two fronts; one is the popularization of liquid cooling, and the other is that noise has been reduced to a maximum of 78 decibels on the A scale . . . that's good news for those who are not snowmobile riders but who must listen to the racket.

THE BACKYARD MECHANIC

SNOWMOBILES

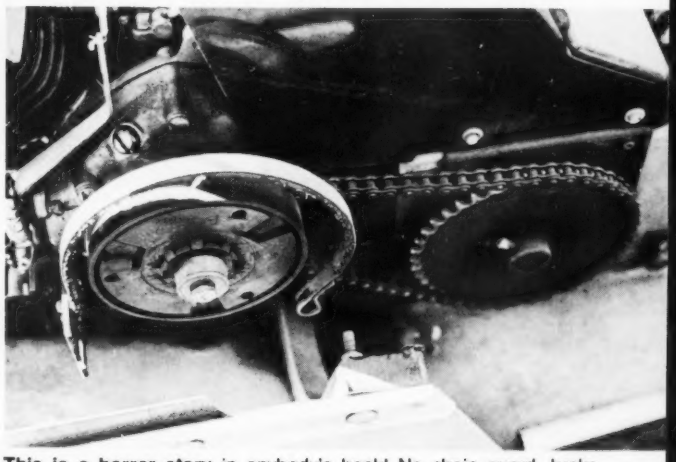
A LIQUID COOLED TAKEOVER?

Engine cooling has gotten a lot of attention, and for good reason. Snowmobiles may operate in ambient temperatures ranging from −40° F to −60°F, and temperatures like these can really affect the life of an engine. Performance of any engine can be enhanced if designers know that engine temperature can be stabilized, and liquid cooling keeps the engine at a constant temperature. Another advantage is that cooling jackets deaden internal engine

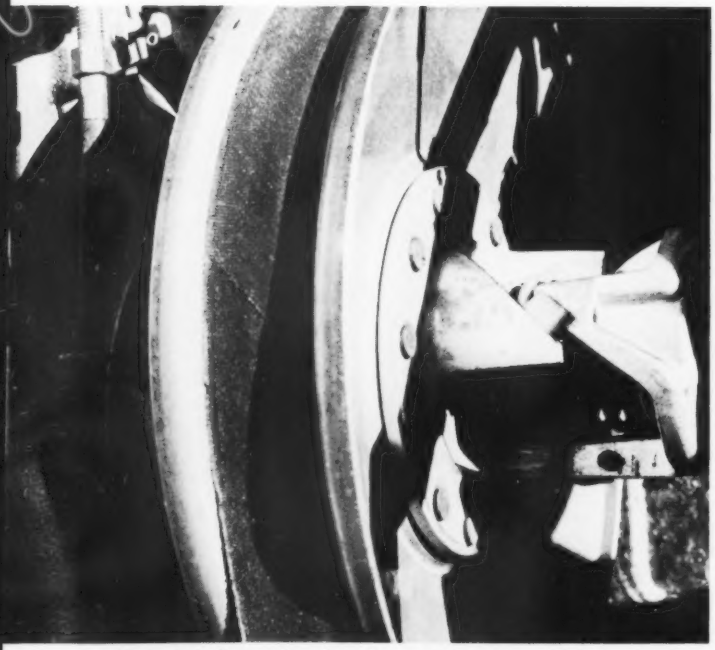
continued

You say you want to do a little snowmobiling? Well, here's a little snowmobile to do it on!

Mid-season checks (and pre-ride checks, for that matter) of all control cables are a must. A broken throttle or brake cable can strand you in the boonies when you'd rather be home in front of the fire.



This is a horror story in anybody's book! No chain guard, brake disconnected, and sprocket retaining roll pin half-way out. There's no excuse for this sorry piece of equipment. The kicker to this is that this is a child's machine! Would you let *your* child ride it?



Ramps, belts, and pulley sheaves should be checked carefully at the mid-season inspection. Belts with more than ⅛-inch of wear (across the surface of the belt) should be replaced.

Disc brakes are the best of the mechanical braking systems, and require little adjusting. Hydraulic discs are even better, having more progressive activation and requiring less actuation effort.

noise, and on a two-stroke powered machine, that can make a lot of difference over a day's riding. Liquid cooling and stabilized temperatures should also make a great deal of difference in engine longevity.

The disadvantages of liquid cooling are increased cost of machine purchase, and added weight. Trying to haul one of the new water-pumpers out of a snowbank may prove a little difficult.

NOISE LEVELS DOWN

All the '77s have been quieted down remarkably well. The 78 dbA reading is measured at 50 feet with the machine moving at full throttle, and a new voluntary standard of 73 dbA at 15 mph will probably enable you to retain your neighbors as friends instead of snowmobile haters.

NEW MODELS

- **Yamaha** – SRX 440A is liquid cooled, essentially a stock racing machine.
- **Polaris** – liquid cooled TXL has 340 cc displacement and is built on racing chassis. Company says it's a good trail machine with a comfortable ride.
- **John Deere** – two new models, both called Liquifires, are 340 cc and 440 cc. Builder claims these liquid cooled engines will get better mileage because the liquid cooled machines require less oil in the two-stroke fuel mix, thereby enabling the engine to run leaner mixtures.
- **Scorpion** – new liquid cooled model is called the Bull Whip, has 335 cc engine.
- **Ski-Doo** – new model called the Elan is claimed to be lowest priced machine on the market.
- **Arctic Cat** – Lynx and Jag are new this year, with Lynx having a forward mounted engine for lower center of gravity, resulting in better handling.

MID-SEASON CHECK

When you get this issue, most of you will be about half-way through the snowmobile season. How about doing a mid-season mechanical inspection? It could save you from being stranded in the boonies at 50 below (which could really ruin your day!).

ENGINE CHECKS

The most basic test for internal condition of a serviceable engine is the compression test. The basic tool is an automotive-type compression tester. Remove the spark plug(s), block the throttle full open, and take the readings on the fourth or fifth compression stroke. Remember compression readings are not absolute . . . they vary with air temperature, altitude, cranking speed, muffler restrictions, etc. Compression should normally be in the 130 to 150 lb. range, with no cylinder varying more than 10% from the average of the others.

High compression readings indicate that the engine has either been hopped up, or has a larger than normal amount of deposits on the cylinder head or piston, or has clogged exhaust ports.

Low compression can mean leaks around the head gasket, or worn rings and excessive bore.

Homelite and Harley-Davidson both supply squeeze-bulb and pressure gauge assemblies for checking crankcase compression (in two-strokes). Your two-stroke should develop a crankcase compression ratio of between 1.3 and 1.5 to 1.

Unless problems are detected by compression checks, this is probably as far as you should go with the engine at the mid-season check. In the words of the Backyard Mechanic . . . "You can't fix somethin' that ain't broken."

CHASSIS AND DRIVE SYSTEM

For years, manufacturers have been trying to do away with the Salsbury Clutch, a complex arrangement of varying diameter pulleys which provides an infinitely variable drive ratio according to engine speed and load. The arrangement is expensive, complex, and difficult to service, but it appears that the Salsbury unit will be with us for some time to come since most manufacturers have managed only to vary the design a little. Yamaha has dual-range forward gears and some makers have added reversers. Some luxury models do utilize a hydraulic torque converter, but the price of these babies is out of sight and all the reliability problems have yet to be solved.

Clutch problems usually make themselves known 12 miles out on the trail, but there are some mid-season checks for engagement that you can perform. A failure or reluctance to disengage is usually caused by too high an idle speed. Clutches are usually designed to function in the 2300 to 3500 rpm range. Visual checks should be made of the sheave condition and alignment, and for ramp damage.

Early clutch engagement is usually traced to weak springs or wrong springs. Too high an engagement speed is related to binding in the weights or ramps, or incorrect springs that are too strong.

!!!!!!!!!!!!!!!!!!!!

WARNING: DO NOT RUN THE ENGINE WITH THE DRIVE BELT REMOVED. The transmission acts as a governor and a free-running engine can easily cause the drive-sheave to grenade.

!!!!!!!!!!!!!!!!!!!!

Snowmobile belts are designed to tolerate tremendous heat and friction along the sides. Replacement belts should always be designated by the manufacturer for snowmobile use.

Uneven wear between belt sides means misalignment of the pulley sheaves, and serious misalignment may

continued

rip the side and cause the belt to flip over in its groove.

Localized wear on both sides indicates a battle with a frozen track. Several narrow spots may mean the idle speed is too high.

In general, replace any belt that is worn $^{1}/_{16}$ to ⅛ inch across the top width.

The drive chain usually operates in a closed case and normally needs little attention. However, chain tension should be checked every 40 hours of operation, and the oil should be changed twice a season (usually at the beginning and mid-season checks). A good rule of thumb for chain tension is from ¼- to ⅜-inch of play midpoint between the sprockets.

Another important check is track tension/alignment. Some manufacturers suggest checking tension after the first two hours, the 10th hour, and every 40 hours thereafter.

Track tension is critical. Too much will accelerate wear of the track and drive mechanism. Too little will upset the relationship between the drive sprocket and internal track lugs. A loose track can come off the sprocket even at moderate speeds.

The usual method of regulating track tension is to move the rear (idler) sprocket back or forward. Determine tension by suspending the machine on jackstands. The track should sag ⅜-inch maximum.

On some machines, tension is determined by the amount of deflection at the top of the track. Yamaha is a little unusual in that the machine must be put on its side and tension checked with a spring gauge. Check your Yamaha manual for exact spring rates and permissible deflection.

Once the tension is within specs, check the lateral runout because a track which is skewed will wear quickly and cause "directional instability," which is a nice way of saying it'll put you on your ear. With the machine still on the jackstands, block the throttle until the track is barely engaged. Looking from the rear, check the run of the track on the drive and idle sprockets and the distance between each side of the track and the side plates . . . this distance should be equal.

Check the condition of the track visually, paying attention to the rivets that hold the cleats on. These should be steel rivets, not aluminum, and should be replaced if the heads or shanks are worn.

Some manufacturers use steel inserts between the sprockets and the track. These should be checked more often than at mid-season inspection (like before any long trip) and are inexpensive to replace.

Pivot arms on bogie wheel systems should be lubed again at the mid-season check, and their torsion springs should be checked too.

Slide rail suspension checks should include shoe wear as well as rail wear.

Track drive sprocket bearing is unprotected externally and should be lubed at mid-season.

BRAKES

With the possible exception of anchors, snowmobiles use almost any kind of braking system. Know your particular system (disc, friction-pad, etc.) but follow these checks with all systems. Brakes should be adjusted so that there is no drag with the lever released. One inch of movement at the tip of the handlebar lever should bring the brake to full lock. Make small adjustments at the cable ends, large ones at the pinch bolt. Check for cable kinking, binding, or hard return. If you decide to resurface the linings or pads, remember not to grind the material off . . . use a scraper instead. Brake material contains asbestos, and the dust resulting from grinding can be hazardous.

Hydraulic brakes should be checked for sponginess indicating air in the lines, leaking, and amount of fluid in the reservoir.

STEERING

Skis should be parallel to each other and point straight ahead when the handlebar is centered. In most cases, play or deviation is caused by the ball joints on the tie rod ends. If the skis aren't parallel, as much as ¼-inch of toe-out is permitted, but absolutely *no* toe-in.

Ski skegs (runners) should be replaced if the skeg is worn more than half of its original height. Also inspect the wear plate that attaches the ski to the leaf spring. Grease the wear plate with low-temp lube at the first of the year and again at the mid-season inspection. If you have multiple leaves in the spring assembly, now might be a good time to use a C clamp and disassemble them in order to put a small amount of grease between the leaves.

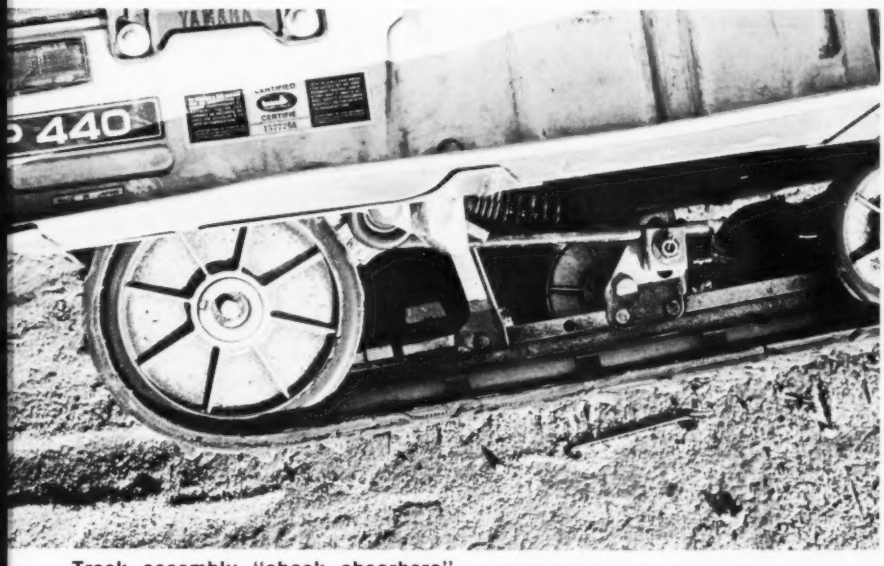
OTHER STUFF

Don't forget to check the lights, cables, track condition, fuel tank and lines, muffler, wiring and instruments, and all the other little bits and pieces that make up your machine.

One last word . . . if you join a snowmobile club, you'll find it's easier to do the checks in a warm clubhouse instead of a drafty garage. Mid-season checks for mechanical integrity and safety always turn out better when a whole club descends on one machine.

Track tension adjustments are accomplished by moving rear idler forward or back. Track tension is important because a track with even a little less tension than required can fly off quite easily.

Ski mounts should be checked for tightness and lubrication. Front shocks, mounting points, and leaf springs should be inspected too. Skeg wear should not exceed half the thickness of the skeg. Skis should be parallel but may have ¼-inch of toe-out. *Any* toe-in can put you on your ear.



Track assembly "shock absorbers" (Yamaha shown here) should be checked for collapsed or broken springs, bent or broken shafts and attaching bolts.

(right)
Track and cleat conditions are both important. A thrown cleat can injure a following rider. This track *looks* pretty mangey, but is still serviceable because it has molded rubber cleats instead of metal ones.

LETTERS TO BACKFIRE THE EDITOR

MOTORCYCLING

A motorcycle in properly trained hands is a safer vehicle than a car. That is, before an accident. In comparing the modern day stock street cycle with today's Detroit special, you find numerous safety factors that make the bike better. Examples of these factors are quicker stopping ability, greater maneuverability, greater visibility, and better acceleration.

Good riders employ all four factors in keeping away from people who try to run into them. They also employ many more things that the average auto driver never thinks of. An example is weaving down the road, coming into the intersection so the guy that was going to turn in front of you thinks you are some type of nut and stops dead still. ("Look at that fool on that cycle. What is he doing?" Answer: "Nothing! Now you see me!")

My advice to those who want to try biking is: Get some first-rate instruction and know your bike inside and out before you drive one foot on the street.

TSgt William D. Hennies
PSC Box 148
APO San Francisco 96328

HELMET HEARING RESTRICTIONS

I ride constantly and wear a helmet religiously. I cannot, however, accept NHTSA's contention that helmets have an inconsequential effect on hearing restriction. At any given moment a rider may be listening to, or for, a specific sound from the cycle itself that would warn of impending troubles from the cycle or for a sound extraneous to the rider's environment that would warn of troubles from that area.

In spite of the amount of noise inherent in cycle engines/exhausts (much of it entirely unnecessary and preventable) a good rider who performs his own maintenance habitually listens to the sounds and knows how the cycle is performing. He can isolate different sounds, those normal from those abnormal, and make a judgment whether to keep riding or to start fixing. A helmet does, unfortunately, interfere in the selective listening process. A resulting spark ping can be discerned without a helmet but can easily be missed with one. The same goes for running a cycle with a properly lubricated chain and a dry chain.

A competent rider is interested in sounds from the machine and those extraneous to the machine. Many of the sounds of interest are muffled by the helmet, something NHTSA evidently failed to consider in their study.

TSgt Frank T. Kolb, USAF
779th Radar Squadron
Opheim AFS, MT 59250

PROTECTIVE EQUIPMENT

I would like to enlighten auto drivers in general and YN1 Simmons in particular regarding car/motorcycle safety (DRIVER, Aug. 1976).

He's right, of course, about the lack of metal protection about a bike rider; however, if the biker is smart, he has something better than a four-wheeled, two-ton bucket of bolts to protect him. It's called "driver presence" or, if you will allow me a couple of old, worn expressions: "Defensive Driving" and of course, my favorite: "Drive to arrive alive."

Utilizing these simple axioms religiously will be enough protection for almost anybody. Leave yourself an out—don't put your vehicle in a position where an accident would most likely occur.

A smart biker wears more safety gear than just a helmet. Heavy leather gloves, a durable jacket, Levis and boots that extend above the ankle are the most accepted recommendations. The only other thing anyone needs for safe, enjoyable motoring on a bike or in a car is good common sense and some sound driving practices.

YN1 F. M. French, USNR (TAR)
N&MCRC
2727 Paloma Street
Pasadena, CA 91107

SNOWMOBILING

I have read the letter written by Capt Carlton S. Severance, II on the Snowmobile. I agree wholeheartedly with his view, i.e., "I do not think he (the snowmobile operator) has the right to invade my privacy, intrude uninvited on private property, etc." But after that we part company.

It should not seem ironic that the article was written by DRIVER, a very important and worthy service to its readers to report certain aspects of safety as it relates to human events, actions and conduct.

Since snowmobiles have been on the recreation scene, many changes in the industry and the machine have taken place. No one will deny there have been abuses. All new sports suffer growing pains. The hundreds of clubs in the USA have gone a long way towards educating the general

public. When a violater is seen, he or she is promptly reported to the proper authorities.

Studies made by competent authorities, including manufacturers, have revealed that the noise made by these machines has little effect on wildlife. Club members are required to have their machines properly muffled. New machines are as quiet as a motor vehicle at 50 feet.

A recent study showed conclusive proof that if all the snowmobiles in the USA were used on any given day, only one-tenth of one percent of total fuel usage would be used by snowmobiles.

I've been a snowmobiler for 11 years. I find it very exhilarating and a fine winter sport if conducted properly.

Mr. Robert M. Oakes, USA
Sierra Army Depot
Herlong, CA 96113

When people band together into clubs in order to participate in strenuous sports–anything from hang gliding to scuba diving–they are infinitely safer and more law-abiding than when they go off on their own. What better way to learn than from the experience of others?

VW CAMPER

In the Aug '76 DRIVER, page 17, is a photograph of a VW with a camper body built around it. I would appreciate any information in regard to the customizing job. Who did it? How much did it cost? Specifications you may have?

Really enjoy your magazine—keep up the good work!

Mr. Johnny Starr (USN Ret)
P.O. Box 963
Orlando, FL 32802

The camper is a "Super Bugger" manufactured by Super Campers, Inc., whom you should contact for more information. Their address is P.O. Box 1155, Newport Beach, CA 92663.

You might also wish to look up the Jan '76 issue of **Hot VWs,** *which contains an excellent, well-illustrated article about the "Super Bugger" on pp. 41-43.*

UNBUCKLING THE SEAT BELT MYSTERY

Having read your Oct. '76 article "Unbuckling the Seat Belt Mystery" I was most impressed with the detail presented on seat belt testing. I do believe an important point was overlooked. The shoulder/lap belt restraining system used on American cars for the past few years remains a mystery. The lap belt coil does have a locking mechanism as described in your article; however, the shoulder coil does not. Is the

shoulder belt supposed to lock on impact? I hope so. It may be that the law only requires the use of one locking device. What then is the purpose of the shoulder belt? Try to activate the shoulder belt lock.

Maj Richard C. Gogolkiewicz, FA, USA
Chief, RWD, DGFT
Ft Rucker, AL 36362

The prime reason you haven't noticed locking reels on shoulder belts is because they are not required by law. Therefore, automobile manufacturers are loath to install them because of the added expense. If shoulder belts are not equipped with locking devices, they must be manually adjustable in order to prevent unrestrained forward movement.

Address your letters to:
Editor
DRIVER Magazine
AFISC/SEDD
Norton AFB CA 92409

WINDOWS DEFROSTING

In reference to your article in the Oct '76 DRIVER "Winter Driving," here's a tip. I don't know if everybody defrosts their windows in this manner or not. It is a tip I learned from my father. Take a bucket of warm water and a rag (after you scrape the ice off the windows) to defrost what the scraping has left behind. As far as I am concerned this trick seems to work fine every time I do it.

A1C Stephen J. Reilly, USAF
6570 Air Base Group
Brooks AFB, TX 78235

Be careful the water is not so hot it cracks the windshield, or the air temperature so low that the water freezes into a sheet of ice. This is a good tip for **moderately cold** *climates.*

"STUDDED" TIRES

You'll probably be inundated with letters on this item, but here's another one anyway.

I assume that the vital word "studded" was inadvertently left out of the "Winter Driving" article on page 7 of your Oct. '76 issue which states:

"One last reminder concerning snow tires: because of the added damage they do to highways, snow tires are restricted by many states to only certain months of the year."

Don't take this letter to represent general criticism. I enjoy reading your magazine and have learned much from the easy-to-understand articles.

MSgt David D. Simmons, ANG
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We meant "studded" all right. Thanks to all who wrote us about the omission.

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BEWARE!

BLACK ICE

Early this winter, four Air Force members were traveling on business in a civilian automobile. It was just past sun-up and the weather was fair but cold. They were driving over dry pavement at about 50 mph when suddenly they encountered ice on a railroad overpass.

Their vehicle started to skid, then slid across the bridge. On the other side the car hit dry pavement again, where it rolled and cartwheeled. Two men were torn from their restraints and ejected. The third was partially ejected. The fourth remained in the car. Two of the four were critically injured, one was killed.

Are you alert for this dangerous ice that appears on otherwise bare roads? Patches occur in shaded areas the sun can't reach—near clumps of trees, behind buildings. The surface of a bridge or overpass can remain icy when the approaching roadways have been clear for hours. If you see ice ahead, brake before you're on it. While on the ice, avoid sudden steering maneuvers.